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A chuck for a semiconductor processing system, comprising: 1.

an annular substrate receiving member having an upper substrate receiving

surface formed thereon;

a hemispherical reinforcement member affixed to a lower surface of the

substrate receiving member; and

an elongated stem portion affixed at a distal end to the hemispherical

reinforcement member.

The chuck of claim 1, wherein the elongated stem portion includes a 2.

broadband actuator assembly.

The chuck of claim 2, wherein the broadband actuator assembly comprises: 3.

a longitudinal bore formed into an interior portion of the stem portion, the

longitudinal bore having a terminating end;

a piston assembly slidably positioned in the longitudinal bore; and

at least one fluid inlet in communication with the longitudinal bore, the at least

one fluid inlet being configured to impart longitudinal motion to the piston assembly

through introduction of fluid pressure to the longitudinal bore.

The chuck of claim 1, wherein the annular substrate receiving member

comprises a disk shaped member having an upper substrate receiving surface and

an underside, the substrate receiving surface having a plurality of vacuum channels

formed therein.

The chuck of claim 4, wherein the plurality of vacuum channels are in fluid 5.

communication with a vacuum cavity formed by the hemispherical reinforcement

member via a selectively actuated valve.

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The chuck of claim 4, wherein the underside includes a plurality of 6.

reinforcement ribs configured to prevent deflection of the upper substrate receiving

surface.

7. The chuck of claim 1, further comprising an air knife assembly mounted

proximate the perimeter of the annular substrate receiving member, the air knife

assembly being configured to generate a laminar flow of gas across the substrate

surface.

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8. The chuck of claim 1, wherein the hemispherical reinforcement member

comprises a hemispherically shaped member having a first open end having a first

radius and a second substantially closed end having a second radius, the second

radius being smaller than the first radius.

9. The chuck of claim 8, wherein the first end is attached to an underside of the

annular substrate receiving member and the second end is attached to a distal end

of the elongated stem member.

10. The chuck of claim 9, wherein the attachment of the first end to the underside

forms a vacuum cavity, the vacuum cavity being selectively in communication with a

vacuum source and a plurality of vacuum channels formed into the upper substrate

receiving surface.

11. A substrate support member for a particle cleaning chamber, comprising:

a substrate receiving member;

a reinforcement member attached to an underside of the substrate receiving

member;

an elongated stem member attached to the reinforcement member; and

an actuator device in communication with the elongated stem member.

12. The substrate support member of claim 11, wherein the substrate receiving

member comprises a disk shaped member having an upper substrate receiving

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surface and an underside, the upper substrate receiving surface having a plurality of vacuum channels formed therein.

The substrate support member of claim 12, wherein the underside further 13. comprises a plurality of reinforcement ribs formed therein, the plurality of

reinforcement ribs being configured to prevent deflection of the upper substrate

receiving surface.

The substrate support member of claim 11, wherein the reinforcement 14.

member comprises a hemispherically shaped member attached at a first end to an

underside of the substrate receiving member and at a second end to the elongated

stem member, the first end having a larger radius than the second end.

15. The substrate support member of claim 11, wherein the reinforcement

member comprises a conic-shaped member attached at a first end to the elongated

shaft and at a second end to an underside of the substrate receiving member, the

first end having a smaller radius than the second end.

The substrate support member of claim 11, wherein the actuator device 16.

comprises a selectively actuated piston assembly.

The substrate support member of claim 11, wherein the actuator device 17.

comprises:

a piston bore formed into the elongated stem assembly, the piston bore being

formed parallel to a longitudinal axis of the elongated stem assembly and having an

upper terminating end;

a piston assembly slidably positioned in the piston bore; and

a propulsion source in communication with the piston bore, the propulsion

source being configured to slidably urge the piston assembly toward the upper

terminating end of the piston bore.

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18. The substrate support member of claim 11, wherein the actuator device is a broadband actuator device.

19. The substrate support member of claim 11, further comprising an air knife assembly positioned proximate a perimeter of the substrate receiving member, the air knife assembly being configured to generate a laminar flow of air across a substrate receiving surface of the substrate receiving member.